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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/689,506	10/20/2003	Huajie Chen	FIS920030241US1	4303

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EXAMINER	
MITCHELL, JAMES M	

ART UNIT	PAPER NUMBER
2813	

DATE MAILED: 10/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/689,506	CHEN ET AL.	
	Examiner	Art Unit	
	James M. Mitchell	2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18 and 22-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *7* is/are allowed.

6)☒ Claim(s) *1-6,8-18 and 22-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/18/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to applicant's amendment filed July 11, 2006.

Specification

2. Claim 23 is objected to because of the following informalities. The sentence appears awkward in that there is no antecedent basis for "the layer of material has a lattice constant..." when the layer is not even formed. If the layer does not exist it does not possess a characteristic. Appropriate correction is required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 1-3, 6, 9-15, 17, 18 and 22-25 are rejected under 35 U.S.C. 102(e) as being anticipated by Ko et al. (U.S 2005/0035470).

5. Ko (Fig. 3g, 4a, 4b) discloses:

(cl. 1, 10, 22) a method of manufacturing a semiconductor structure comprising the steps of: forming a p-type field-effect-transistor channel (201) and a n-type field-effect transistor channel (201) in a substrate; forming a pFET stack in the

pFET channel and an nFET stack in the nFET channel; after the pFET stack is formed, providing a first layer (242) of material at source/drain regions associated with the pFET stack, the first layer of material having a lattice constant different than a base lattice constant of the substrate to create a compressive state within the pFET channel (Pr. 0048); and after the nFET stack (4a-b) is formed, providing a second layer of material (244) at the source/drain regions associated with the nFET stack, the second layer of material having a lattice constant different than the base lattice constant of the substrate to create a tensile state at the nFET channel (Par. 0048);

(cl. 2, 11) wherein the first layer of material is SiGe (Par. 0048) and therefore has a content of Ge approximately greater than 0% in ratio to Si;

(cl. 3) the second layer of material is Si:C (Par. 0048)

(cl. 6, 13, cont. cl. 22, 24, 25) the first layer of material is formed by placing a mask/protective layer over the nFET channel and etching the regions/ channel /source (Par. 0045-0046) of the pFET and selectively growing the first layer of material within the regions of the pFET channel (Par. 0046; and the second layer of material is formed by placing a mask (Par. 0047) over the pFET channel and etching regions of the nFET and selectively growing the second layer of material within the regions of the nFET channel;

(cl. 9, 14) the first layer of material (242) and the second layer of material (244) are embedded in the layer (202; Fig. 4b);

(cont. cl. 10, 18) and doping in situ the source and drain regions of the nFET and pFET structures (Par. 0030);

(cl. 12) the first material creates a compressive stress within the pFET channel; and the second material creates a tensile stress within the nFET channel (Par. 0048);

(cl. 15) wherein the first material and the second material (222, 230) are raised above a surface of the substrate (Fig. 3g)[1].

(cl. 17) the first material is unrelaxed SiGe (e.g. the layer is strained compared to relax layer, Par. 0014 that is conventional);

(cl. 23) the layer of material grown in the channels associated with the pFET/nFET has a lattice constant different than a base lattice constant of the substrate (e.g. same material SIGE and SiC claimed by applicant produces strain in substrate)[2].

6. Claims 1 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (U.S 2005/0051851).

7. Chen (Fig. 8-11)[3] discloses:

(cl. 1, 10, 22) a method of manufacturing a semiconductor structure comprising the steps of: forming a p-type field-effect-transistor channel (122) and a n-type field-effect transistor channel (22) in a substrate; forming a pFET stack in the pFET channel and an nFET stack in the nFET channel; after the pFET stack is formed, providing a first layer (38) of material at source/drain regions associated

[1] Likewise, even assuming that the prior art did not disclose the claimed feature, the size would have been obvious pursuant to paragraph 9 of this office action.
[2] Claim limitation is interpreted to mean that the pre-selected material to be grown when compared to the material of the substrate have different lattice constants.

with the pFET stack, the first layer of material having a lattice constant different than a base lattice constant of the substrate to create a compressive state within the pFET channel (Pr. 0035, 0048); and after the nFET stack (26) is formed, providing a second layer of material (46) at the source/drain regions associated with the nFET stack, the second layer of material having a lattice constant different than the base lattice constant of the substrate to create a tensile state at the nFET channel (Par. 0048);

(cont. cl. 10) and doping in situ the source and drain regions of the nFET and pFET structures (Par. 0030).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 5, 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al. (U.S 2005/0035470).

10. Ko discloses the elements stated in paragraph 5 of this office action, but does not appear to explicitly show its first material and the second material each have a thickness of between about 10 to 100 nm.

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[3] Likewise other cited art, for example Huang (U.S. 7,022,561) could be used to anticipate the claim since independent claim 1 encompasses also an embodiment of the straining layer be formed on top of the substrate without being embedded.

11. Applicant has not disclosed that the first and second layer being at the claimed thickness is for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. As such, the claimed thickness would have been obvious to one of ordinary skill in the art, since it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

12. Claims 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ko et al. (U.S 2005/0035470) in combination with Hoffman et al. (U.S 2004/0253776).

13. Ko discloses the elements stated in paragraph 5 of this office action, but does not appear to explicitly show wherein the Si:C has a content of C of about 4% or less.

14. Hoffman (Par. 0047) utilizes the Si:C has a content of C of about 4% or less.

15. It would have been obvious to one of ordinary skill in the art to form the content of Carbon in the SiC of Ko to be less than 4% in order to produce a

tensile strain layer` as taught by Hoffman (Par. 0047, 0051) and as required by Ko (Par. 0021).

16. Moreover, applicant has not disclosed that the claim percentage is critical. Thus, the differences in concentration will not support the patentability of subject matter encompassed by the prior art, since there is no evidence indicating such concentration is critical. See M.P.E.P 2144.05[R-3}.

Allowable Subject Matter

17. Claim 7 is allowed.

Response to Arguments

18. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. the prior art discloses the use of SiGe and SiC to form compressive and tensile stresses/strains in a NMOS and PMOS.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory

action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 8:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Jmm, J.D.
October 1, 2006